

SCIENCE

NEW YORK, DECEMBER 4, 1891.

DROWNING SUPERSTITIONS.

A STRANGE antipathy once prevailed to rescuing a drowning man, the idea being that the person saved would, sooner or later, do some sort of injury to the man who preserved his life, says a writer in a recent number of the *London Standard*. Sir Walter Scott, in the "Pirate," tells how Bryce, the peddler, refused to help Mordaunt to save the shipwrecked sailor from drowning, and even remonstrated with him on the rashness of such a deed. "Are you mad?" says the peddler, "you that have lived sae lang in Zetland, to risk the saving of a drowning man? Wot ye not if ye bring him to life again, he will be sure to do you some capital injury?" This prejudice, which was deeply rooted among our sea-going community in many parts of the country, existed not very long ago in Cornwall. It is found, too, among French sailors and the boatmen of the Danube, and is widely credited in Russia. Mr. Barry, in his "Ivan at Home," gives a striking instance of the Russian repugnance to save life from drowning. One day, a drunken man got into the water and disappeared. A number of spectators stood by, and gazed on the scene with the utmost indifference, but no one tried to rescue him. A court of inquiry was held, but as, on examination, no cross was found on his neck, a verdict was quickly agreed upon by the villagers, who declared that the man was "drowned because he had no cross on his neck." The Bohemian fisherman shrinks from snatching a drowning man from the waters, fearing that the water-demon would take away his luck in fishing, and drown him at the first opportunity. This, as Dr. Tylor points out in his "Primitive Culture," is a lingering survival of the ancient significance of this superstition, the explanation being that the water spirit is naturally angry at being despoiled of his victim, and henceforth bears a special grudge against the unlucky person who has dared to frustrate him. Thus, when some one is drowned in Germany, the remark is made, "The river-spirit claims his yearly sacrifice," or "The nix has taken him." Out of Europe, also, the accidental drowning of a person is attributed to a similar seizure, and the Siamese dreads the Pnuk, or water-spirit, that seizes bathers and drags them under to his dwelling. The Sioux Indians have a similar fancy, and tell how men have been drowned by Unk-tahe, the water-monster. For the same reason, it appears, the Kamtchadals, far from helping a man out of the water, would drown him by force. If rescued by any chance, no one would receive such a man into his house, or give him food, but he was reckoned for dead. The Chinese reluctance to save a drowning man arises from quite a different belief—it being supposed that the spirit of a person who has met his death in this way continues to flit along the surface of the water, until it has caused, by drowning, the death of a fellow-creature. "A person, therefore," writes Mr. Jones, in his "Credulities Past and Present," "who attempts to rescue another from drowning is considered to incur the hatred of the uneasy

spirit, which is desirous, even at the expense of a man's life, to escape from its wandering."

There are many curious modes of discovering the dead body of a drowned person, a popular notion being that its whereabouts may be ascertained by floating a loaf weighted with quicksilver, which is said at once to swim towards, and stand over, the spot where the body lies. This is a very widespread belief, and instances of its occurrence are, from time to time, recorded. Some years ago, a boy fell into the stream at Sherborne, Dorsetshire, and was drowned. The body not having been recovered for some days, the mode of procedure adopted was thus: A four pound loaf of best flour was procured, and a small piece cut out of the side of it, forming a cavity, into which a little quicksilver was poured. The piece was then replaced, and tied firmly in its original position. The loaf thus prepared was thrown into the river at the spot where the body fell, and was expected to float down the stream till it came to the place where the body had lodged. But no satisfactory result occurred. In Brittany, when the body of a drowned man cannot be found, a lighted taper is fixed in a loaf of bread, which is then abandoned to the retreating current. When the loaf stops, there it is supposed the body will be recovered. Under a variety of forms, the same practice is observed elsewhere, and is found existing among the North American Indians. Sir James Alexander, in his account of Canada, says: "The Indians imagine that in the case of a drowned body, its place may be discovered by floating a chip of cedar wood, which will stop and turn round over the exact spot. An instance occurred within my own knowledge, in the case of Mr. Lavery of Kingston Mill, whose boat upset, and himself drowned near Cedar Island; nor could the body be discovered until this experiment was resorted to." In Java, a live sheep is thrown into the water, and is supposed to indicate the position of the body by sinking near it. But the objects used for this purpose vary largely in different countries. A correspondent of *Notes and Queries* tells how a corpse was discovered by means of a wisp of straw, around which was tied a strip of parchment, inscribed with certain cabalistic characters, written on it by the parish priest. Not many months ago a man was drowned at St. Louis. After search had been made for the body, but without success, the man's shirt, which he had laid aside when he went in to bathe, was spread out on the water, and allowed to float away. For a while it floated, and then sank, near which spot, it is reported, the man's body was found. A curious custom is practised in Norway, where those in search of a drowned body row to and fro with a cock in the boat, fully expecting that the bird will crow when the boat reaches the spot where the corpse lies.

It was a popular theory, in days gone by, that the body of a drowned man would float on the ninth day, a notion which Mr. Henderson informs us prevails in the County of Durham. Sir Thomas Browne alludes to it as believed in his time, and, in his "Pseudodoxia Epidemica" there is a discussion on this fanciful notion. It was also believed that the spirits of those drowned at sea were doomed to wander for a hundred years, owing to the rites of burial having never been properly

bestowed on their bodies, survivals of which belief linger on at the present day. According to Mr. Hunt, in his "Romances of the West of England," fishermen dread to walk at night near those parts of the shore where wrecks have taken place. It is affirmed that the spirits of the drowned sailors haunt such localities, and many a fisherman has declared that he has heard the voices of dead sailors "hailing their own names." This idea is not confined to this country, but is found in various parts of the world.

THE HABIT OF WASHING.

No practice, no custom, however long established, has ever been allowed a permanent right to respect, or even to existence. Sooner or later its turn will come to be weighed in the critic's balance, and its quality will have to be proved. Let us quote, as a recent illustration, the habit of daily bathing, the utility of which has, of late, though not for the first time, been seriously questioned. The reasonableness of doubt in such a matter, and under ordinary circumstances, does not, we confess, says *Lancet*, commend itself to our judgment. Whether the opponents of ablution fear the shock of cold immersion, or whether they dread the cleansing stimulation thus applied to the excreting skin surface, their objection must appear to most persons possessed of ordinary health and vigor to threaten impairment of both by fostering uncleanness. If, on the other hand, it is too free application of heat by Turkish and other warm baths which appears objectionable, we will not deny that there is here a possible ground for complaint. Let it not be supposed that we ignore the curative influence or the cleansing property of this method when used with judgment. It has undoubtedly its fitting time and places if rightly applied. It is no less true, however, that experience has often proved the mischievous effects of its misuse—in case, for example, of cardiac weakness or general exhaustion. Cold bathing in like manner is not without its occasional risks. It is not suitable for persons enfeebled from any organic cause, though mere nervous languor is often braced and benefited by it. It has no proper place among the habits of those who are subject to chronic visceral congestions. As regards one advantage derived from bathing, i.e., its cleansing property, there is no reasonable ground for difference of opinion. Man, whether savage or civilized, appears, as a rule, to have no doubt on the subject. Wherever we find him with water accessible he is a bather. Less practiced by one people than another though it may be, there still is commonly recognizable a constant habit of ablution, and this fact in itself attests at least an almost universal belief in the necessity of ensuring cleanliness by means of washing. Nor can we find reason to doubt the general soundness of this belief. In bathing, temperature is, of course, a chief consideration. For the robust, cold immersion followed by rapid friction is a valuable tonic of nerve, skin, and heart function. For less vigorous constitutions—those, for example, which have been tried by disease, and those of young children—the addition of heat up to the temperate point is only judicious. With some persons a warm bath is a daily luxury. Notwithstanding its efficacy as a means of cleanliness, however, this custom is, or ought to be, discredited by its inevitable action as a nervous depressant, which places it in an unfavorable position compared with the more bracing practice of cold effusion. The benefit derived from bathing, therefore, is likely to assert itself in spite of all adverse criticism, and its mismanagement, which is only too common, should not

be suffered to condemn it in the eyes of any judicious and cleanly person.

NOTES AND NEWS.

In an Austrian periodical, says the *Lancet*, a regimental surgeon named Thurnwald makes an interesting comparison between the wounds caused by the new small calibre bullets and those caused by less recent forms of projectiles. His verdict is favorable. The soft parts are less bruised, and the bones less shattered. At fighting distances the bullets hardly ever remain in the body, and the wounds are smooth, clean, and of small diameter—conditions giving fair chances of recovery.

—At the end of 1890 a census was taken of the population of the Austrian capital, which showed (*British Medical Journal*, Aug. 29, 1891) that it contained 1,380,917 inhabitants, being an increase of rather more than 23 per cent as compared with the enumeration made ten years before. The proportion of the sexes was 51.63 per cent of females to 48.37 per cent of males. The number of persons suffering from mental or physical infirmity was 3,964, of whom 983, or 24.7 per cent, were blind; 980, or 24.7 per cent, were deaf and dumb; 1,627, or 41.04 per cent, were idiots or insane; and 374, or 9.44 per cent were cretins. Of the whole number, 53.13 per cent were males, and 46.87 per cent were females. The excess of males as compared with females, however, holds good only as regards cases of deaf-mutism, insanity, and idiocy; the cases of blindness are equally distributed between the sexes, and as regards cretinism, the fair sex leads easily, the respective percentages being 39.3 males to 60.7 females. On comparing these figures with those of the census of 1880, it will be seen that while blindness has diminished by nearly 10 per cent, and deaf-mutism has remained stationary, insanity and cretinism have increased by 32 per cent. This increase is greater in the female sex than in the male, in the proportion of 43.02 to 23.2 per cent. Of the 983 blind persons, only 21, or 6 per cent, were born blind; the causes of the condition are said to have been blennorrhoea neonatorum (in 14 cases), small-pox (in 11), other affections (in 295), and injury (in 17). Of 381 deaf-mutes not inmates of public institutions, 127, or 33.3 per cent, became deaf and dumb after birth. Of the cretins, 63.4 per cent are between ten and thirty years of age, and 31 per cent can do ordinary household work.

—At a recent meeting of the Asiatic Society of Japan in Tokio, a paper full of curious and interesting information of the condition of the blind in Japan was read by Professor Dixon. In early ages the blind were regarded as unlucky or uncanny, and their condition was one of great misery, until one of the imperial princes was born in this state. His father collected around him a number of blind to amuse him, and when, on attaining maturity, he was appointed governor of three provinces, he took with him blind men to assist him, and for about three centuries the administration of these provinces was always in the hands of the blind. This prince also introduced the practice, which prevails at the present day, of the blind shaving their heads. During the civil contests of the twelfth and thirteenth centuries between the families of Taira and Minnamoto the blind officials were everywhere ejected, and those afflicted with loss of sight fell into their early condition of distress and misery. In course of time orders were issued to the local authorities to provide for the blind in their districts, and now they receive the attention and education usual in all civilized countries. The members of the blind guild, which has long existed, commonly followed two occupations, music or chanting and shampooing or massage, those who practised the former being of a higher grade and frequently enjoying much popular favor. To this day all towns and villages in Japan have their blind shampooers, who go about after night fall with a strange, musical cry. The less skilful among the musicians become professional story-tellers. The higher official grades, which were at one time opened to the blind, were eagerly sought after; those who held them were provided with special marks of their office, and during civil wars blind musicians were frequently employed as spies. The art of shampooing as pra-

tised by the Japanese blind takes nine years to learn. The pupil for the first three years practises on his master; then he spends three years acquiring the art of acupuncture; and for the remaining three years he is on probation, his master receiving half his earnings. Blind men sometimes distinguish themselves outside their regular occupations. One was a famous go player; and it is recorded that, having beaten a prince at the game, his antagonist in a fit of jealous anger killed him, and was himself executed for the crime. Another was a famous author, and compiled a valuable repertory of information in 635 volumes. The blind also practised usury, and acquired much unpopularity from the way in which they treated their debtors.

Cornet (*Zeitschrift für Hygiene*, x, 1891) has estimated that in the past fifteen years 45.82 per cent of all deaths among males, and 49.33 per cent among females, in prisons, were due to tuberculous disease. Below the age of twenty there was no material difference between the death-rate from tuberculosis among prisoners and that among the ordinary population; but between twenty and forty the death-rate was five times as high among prisoners as among the general population. Some of this excess is attributable to insufficient exercise and ventilation, and to want of variety in food. Another cause lies in the probable infection of cells by tubercle bacilli, insufficient care in disinfection being observed. In a considerable proportion of cases of tuberculosis in prisons the disease had existed prior to the incarceration, as is shown by the number of deaths from tuberculosis during the first few months of imprisonment.

—Max O'Reil is a little previous in saying in his "Frenchman in America" that St. Johnsbury, Vt., has a museum, but the Franklin Fairbanks Museum of Natural Science is to be opened to the public in a few weeks. In anticipation of the opportunities to be afforded by the museum, a Natural History Society was organized last spring. Some interesting meetings were held in Athenæum Hall but during the latter part of the summer not a large number could attend. This autumn a reorganization of the society was made, good meetings have been held, and quite a programme laid out for the winter. The meetings will be held in the hall of the museum when that is opened, where special facilities will be afforded the departments of ornithology, conchology, mineralogy, and botany for pursuit of these branches so far as collections may be an aid.

—A very valuable find of skeletons has been made in Egypt by Mr. Flinders Petrie, who has recently opened a number of tombs previously intact at Medum, belonging to the beginning of the fourth dynasty. This is the earliest known date of Egyptian remains, and that to which Egyptians ascribe themselves. The skeletons are well preserved, but tender and friable. Some of them bear unmistakable evidence of rheumatic changes, and consequently indicate that at that very remote period man was subject to and suffered from this, as is now shown from its antiquity, venerable disease. No ornaments or objects of art, except occasionally some rough pottery or a wooden headrest, were found with these remains. The greater number were interred in a contracted position with the knees drawn up to the breast, even when the tomb was long enough to allow burial in the extended position, the body placed on the left side, wrapped in linen cloth, the head always to the north and the face to the east. A few, however, apparently the bodies of the highest class or race, were interred in the extended position along with vases of stone or pottery and headrests. At this period there is no trace of mummification. The essential difference in the mode of interment seems to point to difference of race, and it is probable that the contracted burials are those of the prehistoric race of Egypt, while the dynastic race were interred with the body extended. It is extremely interesting to find these contracted burials common at so early a date in Egypt, as a similar mode was adopted by the earliest inhabitants of Great Britain. Mr. Petrie has brought the skeletons to England, and deposited them at the College of Surgeons, where they are being treated (*Brit. Med. Jour.*) so as to strengthen them and render them available for the anatomical investigation which Mr. Petrie intends to have made in order to determine, if possible, their ethnographical affinities.

—There are not many remains of the ancient Mexican feather-work which excited the surprise of the Spanish conquerors of the New World. The most famous surviving specimen is the standard, described by Hochstetter, which is now in the Vienna Ethnographical Museum. Another specimen has lately been discovered by Mrs. Zelia Nuttall in the Schloss Ambras, near Innsbruck, says *Nature*, Nov. 10. It is mentioned in an inventory, drawn up in 1596, of the treasures of the castle. This very valuable relic is the decorative part of a round shield made of interlaced reeds, and consists of feather-mosaics representing a monster, the contours of which are fastened by strips of gold. Formerly the shield was adorned with costly quetzal feathers, only small fragments of which survive. *Globus*, which has an interesting note on the subject, speaks of similar old Mexican shields in the Stuttgart Museum, and refers to a statement of Stoll to the effect that beautiful feather-ornaments are still made by the Indians of Guatemala.

—Thompson (*Lancet*, Oct. 24, 1891) has recorded the case of a blacksmith who was struck in the left eye by a fragment of flying steel. Both eyes soon displayed evidences of irritation, with considerable impairment of vision in the left. Ophthalmoscopic examination of the injured eye revealed the presence of a foreign body in the retina, together with slight exudation and hemorrhage, and a number of fine, opaque striæ in the vitreous body. The patient being etherized, the original wound was reopened and the curved pole of an electro-magnet was introduced and passed through the vitreous in a direction corresponding to that apparently traversed by the foreign body. The second application was followed by the appearance of the bit of steel "in tow" of the magnet. The small bead of vitreous that presented was snipped off, the eye was antiseptically irrigated, and a compress was applied. In the course of a short time the manifestations of irritation subsided and vision became improved, though a slight patch of opacity remained upon the retina, and the field of vision was correspondingly limited.

—At the Académie de Médecine M. Chaveau read a long paper on the relations existing between small-pox and vaccine as regards the transformation of the virus (*Medical Press*, Nov. 4). He said that the idea that vaccine was only a transformation of small-pox continued to obtain a large number of partisans. He, on the contrary, believed that the virus in both cases proceeded from the same origin. It was true the absolute proof was not yet established, but that they were distinct affections he did not doubt. Attempts were made by a Lyons committee to transform human small-pox into vaccine by inoculating cows, but the virus remained the same as to its nature even after several cultivations, consequently it must be accepted that the simple passage of pox virus in the organism of the cow or horse is entirely incapable of changing this virus into vaccine. Vaccine never produced small-pox in man, nor did human small-pox ever become vaccine when inoculated into animals. Vaccine is not, consequently, an attenuated small-pox.

—A Colombo journal gives an interesting description of the manner in which the natives of Ceylon mine for plumbago. A native usually drives a shaft until he is no longer able to contend with the flow of water in the mine. He then stops working, and afterwards drives galleries, and this he continues to do as long as his lamps will burn; but the moment they are extinguished by the gases collected in the gallery he ceases working in that part and continues upwards, refilling the shafts he has dug with the débris from the mine. In other cases, instead of sinking a shaft, a large open cutting is made, in which the vein is followed, and galleries afterwards run as occasion may require. There is no system for ventilating the mines, and the result is that after a blast much time is wasted before the mine is sufficiently cleared of foul gases to allow working to be resumed. The great object of the native proprietor is to keep his expenses as low as possible. As to the timber he is using, he knows nothing of its strength, and is quite unable to work out the strain it will stand. The result is that the shafts and galleries are frequently insufficiently timbered. The windlass used is frequently not strong enough and has no ratchet-wheel, so that serious accidents may occur in raising and

lowering miners. The rope is the ordinary coir rope of the country, the strength of which varies very much according to the make and the quality of the fibre used. Instead of ropes, ladders are frequently used by the miners, and these are made of the roughest materials and frequently tied with jungle rope or ordinary coir yarn. There is no regulated distance between the rungs, and the ladder is placed perpendicularly to the bottom of the pit, and when it is remembered how highly lubricated the wood must get from the hands and feet of the natives who have been working plumbago, the great danger they run every time they mount and descend can be well conceived. Various minerals are dug out of plumbago mines with which the natives have no acquaintance, and consequently valuable minerals are sometimes thrown away. Pitchblende, known as a valuable ore of uranium, has been found inside plumbago; pyrrhotite also is found largely in plumbago mines, from which, in other countries, the greater part of the nickel of commerce is extracted.

— The past year was a prosperous one for the Colorado College Scientific Society. The following is a complete list of papers and reports presented to the society: Oct. 14, 1890, The Abandonment of Children in Ancient Greece and Rome, by George L. Hendrickson; Recent Researches in Magnetism, by Florian Cajori; Nov. 14, Witchcraft among the Hindus, by Dr. H. W. Magoun; Dec. 11, Protection of Congressional Minorities, by W. M. Hall; Pulsations in the Aortic Arches of the Earthworm, by Miss M. R. Mann; Solidarity of the Race, by J. M. Dickey; Jan. 13, 1891, Dialectical Studies in West Virginia, by Dr. Sylvester Primer; Men for the Hour, by H. J. Barber; Feb. 10, Germ Theory of Disease, by Miss M. R. Mann; On Two Passages in the Crito, by Dr. H. W. Magoun; Mar. 24, On van't Hoff's Law of Osmotic Pressure (published in the *Chemical News*, Apr. 10, 1891), by D. J. Carnegie; The Aryan Question, by Dr. Sylvester Primer; Apr. 21, An Interpretation of the Fourth Gospel in the Light of Gnostic Philosophy, by President William F. Slocum; The Elliptic Functions Defined Independently of the Calculus, by F. H. Loud; The Study of Diophantine Analysis in the United States, by F. Cajori; May 12, Cross Ratio, by B. E. Carter, Jun.; Calibration of Burettes, by D. J. Carnegie; June 9, On a Passage in the Frogs, by Dr. H. W. Magoun; Note on the Hadley-Allen Grammar, by Dr. H. W. Magoun; Historical Note on the Differentiation of a Logarithm, by F. Cajori; A Mathematical Error in the Century Dictionary, by F. Cajori.

— The last volume of the memoirs of the Statistical Section of the Russian Geographical Society contains an interesting work by M. Borkovsky, who has devoted more than twenty-five years of his life to the study of the grain-production of Russia, and the directions in which cereals are transported within Russia both for export and for home consumption. The results, according to *Nature*, totally upset the current theory as to Russia being a granary of Europe, and are grimly confirmed by the famine which now prevails in several provinces of the empire. It appears from M. Borkovsky's figures and maps that Russia may be divided into two parts, strictly dependent on her orographical structure: one of them, which corresponds to the south eastern slope of the broad swelling which stretches across the country from south-west to north-east, has an excess of grain during the years of good crops, which excess sometimes exceeds twice or thrice the wants for local use. But there is also another part — the north-western one — which always has less corn than is wanted for its population. Taking the years 1882-85, which were years of average crops, a line traced from Kieff to Nijni-Novgorod and further north-east divides Russia into two almost equal parts, of which the south-eastern exports wheat and rye into the north-western part to the amount of no less than 710,000 tons of wheat and 508,000 tons of rye, the exports to foreign countries attaining at the same time the respective figures of 1,780,000 and 1,029,600 tons. Taking into account the respective populations of the two regions, and the amount of corn consumed by the distilleries (which does not exceed 14 English pounds per inhabitant), M. Borkovsky shows that the total consumption of wheat and rye attains only the figure of 437 pounds per inhabitant (109 pounds of wheat) in the exporting region, and the still lower figure of 382 pounds (46 pounds of

wheat) in the region which imports corn. The average consumption throughout Russia thus attains only 430 pounds per inhabitant, out of which 14 pounds must be deducted for the use of the distilleries. The figures will certainly seem very low if it is remembered that the great mass of the Russian peasants consume extremely small quantities of meat — bread being their chief and almost exclusive food. It appears, moreover, that if Russia exported no grain at all, and the whole of the crop of cereals were consumed within the country, the average consumption would nearly approach the average consumption in France — that is, 505 English pounds on an average year; while the surplus obtained during years of exceptionally good crops would only cover the deficit during the bad years, which recur in the steppes of South-east Russia with almost the same regularity as in India, i.e., every ten or twelve years.

— The experiment department of the Ontario Agricultural College at Guelph reports, in bulletin 49, the following experiment: In the fall of 1890 five hundred grade lambs were purchased in the eastern part of Ontario. As purchased they were turned into rape fields and fed upon the rape until Oct. 20, when ninety were selected for the experiment. These were shorn Oct. 22 and 23, and weighed October 24. They were pastured on the rape in fine weather, but kept housed in rough weather until Nov. 21, after which they were confined to the sheds and the yards in front. The shed was a large building, with ceiling 10½ feet high and hay-loft overhead. It was divided into compartments large enough to hold 16 or 17 lambs, each compartment having a small yard attached. The lambs were fed a ration consisting of oats 7 parts, oat screenings 1 part, peas 3 parts, and bran 1 part by weight, together with all the hay they would eat, and an average of three pounds of sliced turnips per day — beginning with one pound and increasing to five pounds. They were fed from November 21, 1890, to April 24, 1891, when they had consumed a total of 12,408 pounds of oats, 1,062 pounds oat screenings, 4,712 pounds peas, 1,777 pounds bran, 13.9 tons hay, and 25.15 tons turnips. The average weight of the lambs at the beginning of the experiment was 84.85 pounds, and at the end 135 pounds. The average gain per month was therefore 8.25 pounds. At the end of the experiment ten more lambs were added to the lot, making one hundred in all, and these were shipped to Liverpool, where they arrived in good condition and were sold at an average of \$11.79 per head, the cost of shipment being \$3.75 per head. It is stated that this cost was excessive, owing to the small number shipped, and that larger lots could be shipped at \$2.50 to \$3.00 per head. Of the ten lambs added to make up the hundred, five were freshly shorn and five had not been shorn at all. It was found that the autumn shorn lambs stood the journey better than either the unshorn or those freshly shorn, and that they occupied less space than the unshorn lot on shipboard.

— The following, briefly stated, are prize subjects recently proposed by the Dutch Academy of Sciences, at Haarlem: (1) Molecular theory of internal friction of gases departing from Boyle's law, and if possible, of liquids. (2) Determination of the duration of electric vibrations in various conductors. (3) Try inoculation of *Viscum album* on apple, pear, chestnut, and lime trees, and explain its preference for certain species. (4) Criticism of opinions on structure and mode of growth of the cell-wall, having regard to continuity of the protoplasm of the adjacent cells (in some cases). (5) New experiments on the reproductive power of parts of plants, and the polarity observed in it. (6) Study of the low organisms appearing (usually as filaments) in bottles containing solutions of chemical products, after long standing. (7) Significance of peptones for the circulation of nitrogen in plants. (8) Oxidation of ammoniacal salts in the ground, and transformation into nitrates. Do the microbes found by Winogradsky and Frankland exist in the soil of Holland? (9) Researches on the organism concerned in production of marsh gas, or the conditions in which the gas is formed, if life has only an indirect influence on the phenomenon. Liberation of the gas from manure. (10) Study of the microbes involved in ensilage of green fodder, and of the variations of sugar and acidity with temperature and time. (11) The development of Tricladæ. (12) The development of the

spleen. The prize offered in each case is a gold medal or a sum of 150 florins. Memoirs may be written in Dutch, French, English, Latin, Italian, or German (not German characters), and they are to be sent in, with sealed packet, to the secretary before January 1, 1893. (Further particulars in the *Revue Scientifique*, Oct. 10, 1891.)

— A conference of educators began Nov. 2 at Newberry Library, Chicago, according to a despatch to the New York *Tribune*, to discuss the methods of executing the general design already formed of inaugurating University Extension work in Chicago. There were present President Harper of the University of Chicago, President Rogers of the North-western University, President Chamberlain of Madison University, President Eaton of Beloit University, President Coulter of the University of Indiana, Regent Burrill of the University of Illinois, Professors Moss and Forbes of the University of Michigan, Professors Turner and Freeman of Madison University, Professor Young of the North-western University, and Dr. Poole of the Newberry Library. President Rogers presided, and the session was private. There was a difference of ideas amounting almost to friction as to how university extension should be effected. The Newberry Library will equip rooms and furnish books, the public Library will assist, and instructors will be provided in abundance. But there the agreement ends. There is a radical difference of opinion as to whether the university should co-operate in the work, or each university carry on its work separate from the others. Dr. Harper stands for those who insist on separate work, and Dr. Rogers for those who insist on co-operation.

— At the meeting of the Royal Meteorological Society, Nov. 18, the following papers were read: (1) "Account of an Electric Self-Recording Rain Gauge," by Mr. W. J. E. Binnie. This is a very ingenious instrument, and has been constructed on the assumption that all drops falling from an orifice or tube are identical in weight, as long as the dimensions of the orifice are not varied. (2) "On Wet and Dry Bulb Formulæ," by Professor J. D. Everett. This is a criticism of the methods investigated some years ago by Mons. August and Dr. Apjohn for determining, by calculation, the maximum vapor tension for the dew point from the temperatures of the dry and wet bulb. Professor Everett also criticises the values adopted by Regnault, and says that in presence of the uncertainty as to a rational formula, he thinks Mr. Glaisher did wisely in constructing his table of factors, which give the dew-point approximately by the most direct calculation which is admissible. The inherent difficulties of hygrometric observation and deduction are great, and have not yet been fully overcome. (3) "Results of Meteorological Observations made at Akassa, Niger Territories, May, 1889, to December, 1890," by Mr. F. Russell. This was in continuation of a former communication respecting the same place. After detailing the results of the various observations, the author says that this period was very unhealthy, and the year 1890 especially so. The weather was exceptionally dry, with small-pox and phthisis amongst the native population. The West Coast reports generally were also unfavorable in reference to the condition of resident Europeans, and at the principal ports quarantine regulations were put in force, consequent upon an outbreak of yellow-fever in places situated to the south-west. At Bonny ten deaths occurred from November to February out of a population of some sixteen Europeans.

— The Brooklyn Institute December bulletin of lectures is as follows: Dec. 1, Department of Philology, lecture in the course on "The Victorian Poets," by Mrs. Abby Sage Richardson, subject, "Robert and Elizabeth Browning;" Dec. 1, Department of Entomology, lecture by Professor John B. Smith of Rutgers College on "The Morphology of the Tools and Weapons of Insects;" Dec. 2, Department of Geology, lecture by Professor William B. Scott of Princeton College on "The Age of Mammals;" Dec. 3, Department of Psychology, lecture by Professor Franklin W. Hooper on "The Physics and Psychology of Seeing;" Dec. 4, Department of Philology, second of the Shakesperian Recitals, by Mr. Hannibal A. Williams of New York, subject, "Julius Cæsar;" Dec. 4, Department of Electricity, lecture by Mr. William S. Barstow, gen-

eral superintendent of the Edison Illuminating Company on "The Direct Application of the Armature of a Motor to the Running of Machinery;" Dec. 5, Department of Chemistry, lecture by Dr. Arnold Eiloart of Cornell University on "The Arrangement of Atoms in Space, or Stereo-Chemistry;" Dec. 7, Department of Microscopy, lecture by the Rev. Frederick Carter of Montclair, N.J., on "Desmids;" Dec. 8, Department of Philology, lecture in the course on "The Victorian Poets," by Mrs. Abby Sage Richardson, subject, "Longfellow, Lowell, and Whittier contrasted;" Dec. 8, Department of Engineering, lecture by Mr. C. J. H. Woodbury, vice president of the Boston Manufacturers' Fire Insurance Company of Boston, on "The Proper construction of Buildings to Resist Destruction by Fire;" Dec. 9, Department of Music, lecture by Mr. W. J. Henderson of the New York College of Music on "The Development of the French Drama;" Dec. 9, Department of Zoology, lecture by Mrs. Annie Chambers-Ketchum of Rutgers College, New York, on "The Evolution of the Lower Reptilia;" Dec. 10, Department of Painting, lecture by Mr. William Ordway Partridge on "The Practical Details of Modelling;" Dec. 10, Department of Political and Economic Science, Mr. Bolton Hall of New York has been invited to lecture. Discussion of the lecture by members of the department. Large lecture-room; Dec. 11, Department of Philology, third Shakesperian Recital, by Mr. Hannibal A. Williams, subject, "The Taming of the Shrew;" Dec. 11, Department of Geography, lecture by Mr. Charles M. Skinner of the Brooklyn *Eagle* on "The Mountain Systems of British Columbia," illustrated by photographic views of mountain scenery; Dec. 12, Department of Mathematics, lecture by Mr. Julius Henry Cone of the Brooklyn Classical School on "The Teaching of Algebra;" Dec. 14, Department of Astronomy, paper by Mr. Gardner D. Hiscock on "The Constitution of the Sun." The paper and the discussion following will be illustrated by lantern photographs; Dec. 15, Department of Philology, lecture in the course on the "Victorian Poets," by Mrs. Abby Sage Richardson, subject, "The Modern Spirit in Poetry;" Dec. 15, Department of Botany, lecture by Dr. Byron D. Halstead of Rutgers College on "Typical Forms of Cryptogamia;" Dec. 16, Department of Architecture, lecture by Mr. Russell Sturgis, president of the New York Architectural League, on "Museums for the People;" Dec. 16, Department of Mineralogy, lecture by Mr. Edgar A. Hutchins, member of the Institute, on "Quartz and its Varieties;" Dec. 17, General Meeting of the Members of the Institute, address by Professor Truman J. Backus, LL.D., president of the Packer Collegiate Institute, on "The Age of Discovery;" Dec. 18, Department of Philology, fourth Shakesperian Recital, by Mr. Hannibal A. Williams, subject, "The Winter's Tale;" Dec. 18, Department of Electricity, lecture by Mr. J. Stanford Brown on "Electrical Units in Theory and in Practice;" Dec. 19, Regular Monthly Meeting of the Council; Dec. 21, Department of Archæology, lecture by Dr. Theodore F. Wright of Cambridge, Mass., secretary of the Palestine Exploration Society, on "The Recent Archæological Explorations in Palestine;" Dec. 22, Department of Philology, last of the series of Shakesperian Recitals, by Mr. Hannibal A. Williams subject, "Othello;" Dec. 22, Department of Psychology, lecture by Dr. Thomas Balliet of Springfield, Mass., on "The Physics and Psychology of Hearing;" Dec. 23, Department of Physics, lecture on "Static Motors;" Dec. 26, Department of Archæology, organization of a section of Numismatics, lecture by Dr. Charles E. West, LL.D., president of the Department, on "Jewish Coins;" Dec. 28, Department of Photography, lecture by Mr. Wallace Gould Levison on "Photography as an Aid to Science, History, and Art;" Dec. 29, Department of Music, concert by the Beethoven Quartet Club of New York, assisted by a vocalist; Dec. 30, Department of Philology, German section, lecture by Professor Frederick W. Grube of the Boys' High School on "The Philology of the German Case Endings;" Dec. 31, General Meeting of the Members of the Institute, lecture by Mr. Garrett P. Serviss, president of the Department of Astronomy, on "The Old Year and the New," or "The Revolutions of Worlds." After paying the initiation fee of \$5, associate membership in the Institute costs only \$5 a year; extra tickets of admission for the month of December, \$4; extra tickets for one week, \$1.50; single admission, 50 cents.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

TECHNICAL EDUCATION AT ST. ETIENNE.

FOR the past twenty years the French Government has devoted a great deal of attention to the education of the people. National schools, says the United States consul at St. Etienne, have been opened in almost every village, and the instruction given is of a very useful order. Besides the primary schools, there are superior schools where diplomas for "great merit" may be obtained. These latter, however, are only attained by pupils belonging for the most part to the middle classes, who intend to become teachers or governesses in public or private institutions, or by those who have no other purpose in view than of being considered fairly well educated. As the working classes, on the other hand, cannot afford for their children the expenditure of time and money which a course of these higher schools involves, they are obliged to withdraw them when they have received the certificate of elementary education which is generally given to children between the ages of twelve and thirteen. It is for this poorer class that towns of importance throughout France have established well-equipped schools where various trades are taught gratuitously, both practically and theoretically. St. Etienne being one of these important cities, with 113,000 inhabitants, possesses a model, well organized, and successful technical school.

The technical institution of St. Etienne was built in 1885 at a cost of \$115,000. The school has three hundred students, and the trades taught are weaving, dyeing, sculpture, iron founding, cabinet making, etc. The apprenticeship is four years in duration, and the institution is free. At the end of four years, a certificate of aptitude is given, which enables the pupil to obtain a situation in the line of industrial labor which he had chosen. The work of the school begins each day at seven in the morning, and ends at seven in the evening. The school is composed of two buildings. The first is reserved for general education, and the second contains the different workshops, occupying 1,400 square metres of surface. The fitting up of these workshops is very complete, and comprises vices, lathes, boring, planing, and other machines,

forges, anvils, steam-hammers, carpenters' benches, circular saws, weaving machines of every variety, and all the accessories of the dyeing industry, as well as important collections of chemical and physical apparatus. The whole building is lighted by electricity.

The lectures are of two kinds. The first are common to all students of the same year, and embrace general subjects, while the second are exclusively technical, and are special to each section. In the first year, the students pass through all the workshops to be initiated into the proper handling of the different tools, whether of iron or wood. After this period, the boys are classed according to their tastes, desires, and aptitudes. They work at manual labor three hours daily during the second year, four hours in the third, and five in the fourth and last year for the first six months, and seven hours during the last six months, in order to accustom them to the burden of a day's work. During this period, also, great attention is paid to the teaching of the theory of the different trades, that is to say, the fitters are taught to trace and cut out cog-wheels, and the carpenters to design and execute a certain number of apparatus, such as stairs of different variety, shutters, balconies, etc., on a reduced scale. The weavers, besides being taught thoroughly all the details of the loom and its working, receive special lessons in book-keeping, legislation, commercial geography, and are taught one of the modern languages. Very careful attention is paid to design. The apprentices at all the trades are obliged to follow the instruction given on this subject, which is rightly considered of the greatest importance in the school. Designs of various kinds are executed by the more advanced sections, and every year an exhibition of the work of the boys is held.

Consul Loomis says that the results of this school have been most excellent, and he has been informed that, as a rule, its graduates become self-supporting members of society in a very short time.

THE PRODUCTION OF BUTTER.

BULLETIN No. 17 of the Pennsylvania State College Agricultural Experiment Station, by Professor Thomas F. Hunt, details some carefully conducted experiments with twelve milch cows to determine the value of cotton-seed-meal as compared with bran for the production of butter. The main inquiry was with reference to the relative effect of cotton-seed meal and bran upon the quality of the butter. The quantity of food required to produce a given quantity of butter, the effect of the food upon the health of the animals, and the effect of the food upon the completeness with which the butter fat was recovered from the milk were also subjects of research.

There were three feeding periods of four, four, and two weeks, respectively. The cows were divided into two lots of six cows each, care being taken to have the two lots as nearly comparable as may be.

Beginning with a small quantity of cotton-seed-meal, six cows were fed an increasing quantity of cotton-seed-meal until six pounds were given daily per animal. This heavy feeding of cotton-seed-meal, fed during April and May, did not affect the health of cows averaging 900 pounds each. Calves were fed one pound of cotton seed-meal daily, in skim milk, with apparently disastrous results.

The six check cows were fed bran in place of cotton-seed-meal, while all the other food offered was the same in each lot. The yield of milk was increased about one-fifth when

cows were fed cotton-seed-meal instead of bran, the cotton-seed-meal constituting about three-fifths of the grain ration, and about one-fourth the total food eaten. This conclusion is reached by two comparisons which substantially check. First, the yield of milk from the cows fed cotton seed-meal was compared with that of those fed bran; and, second, the yield of milk from the cows fed cotton-seed-meal was compared with that from the same cows fed bran. This is shown in the following table, which gives the milk produced daily per animal by four cows of each lot:

	Period I. pounds.	Period II. pounds.	Period III. pounds.
Lot I.	19.4	19.5	19.0
Lot II.	23.4	23.9	19.6

Lot I. during all these periods and Lot II. during period III. were fed a ration containing bran, while Lot II. during periods I. and II. was fed a ration containing cotton seed-meal. We have not noticed this double method of comparing results being used in a feeding experiment heretofore. As the per cent of fat was not materially changed the quantity of butter fat was appreciably increased by feeding cotton-seed-meal in place of bran.

Butter was made both with the extractor and with the churn and deep cold-setting system, — twelve churnings with the extractor and four with the ordinary churn. With the extractor, the per cent of fat recovered was practically the same whether bran or cotton-seed-meal was fed. The per cent of fat recovered varied in ten "runs" with the extractor from 80.3 to 90.6 per cent, — averaging about 86 per cent. With the deep cold-setting system slightly more fat was left in the skim-milk and in the butter-milk when bran was fed.

Samples of butter made from eight lots of milk in which the grain ration was corn-meal and bran, and samples of butter made from the same number of lots of milk in which the bran was more or less completely displaced by cotton-seed-meal were rated by one or more commission merchants. A's score, who rated all the samples, is given in detail. He decided that the bran butter was 18 per cent better in body, 12 per cent better in smelling flavor, 9 per cent better in tasting flavor, 9 per cent better in salt, and 2.5 per cent better in color than the cotton-seed-meal butter. While there was considerable variation in opinion among the several judges, there was a general agreement that feeding cotton-seed meal reduced the quality of the butter.

The conditions of manufacture of the two kinds of butter were alike, but it is shown that cotton-seed-meal butter requires to be salted heavier than bran butter, and it is suggested that if more salt had been used in making the former as compared with the latter, the two kinds of butter might have been nearer equal in quality.

The average melting-point of eight samples of bran butter was 93° F., while that of eight samples of cotton-seed-meal butter was 99° F. The average per cent of fat was practically identical in both kinds of butter, being about 78 per cent.

SAVAGE RELIGION.

At a meeting of the Anthropological Institute of Great Britain and Ireland, the president, Dr. Edward B. Taylor, read a paper on "The Limits of Savage Religion."

Dr. Taylor pointed out that, in defining the religious systems of the lower races so as to place them correctly in the history of culture, careful examination was necessary to

separate the genuine developments of native theology from the effects of intercourse with civilized foreigners. This borrowing in some degree from the religious ideas inculcated by foreigners was generally admitted; but he said that he would show that it had taken place to a much greater extent than had been supposed. Especially through missionary influence since 1500, ideas of dualistic and monotheistic deities and of the moral government of the world had been implanted on native polytheism in various parts of the globe.

The mistaken attribution to barbaric races of theological beliefs really belonging to the cultured world, as well as the actual development among these races of new religious formations under cultured influence, had been due to three principal causes: (1) Direct adoption from foreign teachers; (2) the exaggeration of genuine native deities of a lower order into a supreme god or devil; (3) the conversion of native words denoting a whole class of minor spiritual beings, such as ghosts or demons, into individual names alleged to be those of a supreme good deity or a rival evil deity. Conspicuous among the cases of borrowing from the beliefs of a higher culture was the famous belief in the "Great Spirit" of the North American Indians. Philosophers had long been wont, on the strength of this belief, to point to the "poor Indian, whose untutored mind sees God in clouds, and hears him in the wind;" but that the "Great Spirit" belief was really the product of the tutored mind of the Jesuit missionaries in Canada was proved by their own records. In South America, among the tribes of the regions of the Orinoco, missionaries and travellers had recorded the names of great divine beings, good and evil, which, could they be received as native to these rude people, would prove that the religion of the lower culture involved a conception of a supreme creative being. Yet, when the names of these recorded deities were translated, the result threw light on their probable origin outside any native development of religion. They might variously be interpreted as "The Highest," "Lord of All," "Creator," and "Our Great Father;" and these were obviously to be attributed to the missionary teaching which had been going on for three centuries.

The Maipuri tribe explained to Father Gilij, who had written such valuable accounts of the Orinoco tribes, how their spirit Purruminari ("Lord of All") created man, and formed woman afterwards by extracting a rib from man during his sleep; and, further, how, again in accordance with Genesis, light was created before the sun. They had an account also reproducing the very details of the divine birth according to Christian dogma; and all this Father Gilij accepted as proof of sacred tradition having been preserved since the beginning of the human race, regardless of the fact that there had been intercourse with Europeans since 1535. These tribes had stories of a universal deluge, told as native traditions, with details plainly borrowed from European teaching, such, for instance, as the story of the great waters being sent by the "Creator," from which only one man escaped, and he in a canoe, whence he sent out a rat to see whether the water had fallen, the rat returning with an ear of Indian corn. Australia afforded much material for the illustration of the question in hand.

Since the period of European colonization, a crowd of alleged native names for the Supreme Deity and a great evil deity had been recorded. Bishop Salvado of the Benedictine Mission in West Australia gave an account of the savages' belief in an omnipotent creator called "Montogon" (believed to be a wise old man of their own race), and also in a malignant spirit, extremely feared, called "Chenga." This region

and its languages had years before been excellently described and studied by Sir George Grey and by Advocate-General Moore; and, from their records, it appeared that the natives spoke of a spirit, "Mittagong," who, was, however, an insignificant demon identified with phosphoric fungus. As for "Chenga," he was not an individual at all. The dead, or the spirits of the dead, were called "djanga," and this word was applied by the savages to the white men, whom they regarded as the spirits of their forefathers returned. This misapplication of the name of a class to a particular person was largely due to the fact that communication between savages and white men was carried on in dog-English, when a few words were strung together without particles or inflections. Thus the savage, living in terror of beings closely corresponding to our ghosts or demons, learned to use the word "devil" in connection with them. The white man, accustomed to the ideas of a dominant Satan, wrote the word in his note book with a capital letter, unconscious that he was thus converting the savage's simple belief in spirits into a dualistic religion where a great personal evil was opposed to the great good being.

The German Moravian missionaries who went into the interior of Victoria in 1850 recorded that they found among the natives a belief in a spirit, "Baiaime," the creator of all things, who dwelt above the clouds. Mr. W. Howitt also described this "Baiaime" as he found him, and gave the following account, told by a native sorcerer, who had, according to custom, gone to "Baiaime" for instruction in the supernatural: "My father had said we will go to 'Baiaime's' camp. He got astride of a thread, and put me on another, and we held by each other's arms. At the end of the two threads was 'Wambu,' the bird of 'Baiaime.' We went through the clouds, and on the other side was the sky. We went through the place where the doctors go through, and it kept opening and shutting very quickly. My father said that, if it touched a doctor as he was going through, it would hurt his spirit, and, when he returned home, he would sicken and die. On the other side, we saw 'Baiaime' sitting in his camp. He was a very great old man, with a long beard. He sat with his legs under him, and from his shoulders extended two great quartz crystals to the sky above him. There were also numbers of the boys of 'Baiaime' and his people, who are birds and beasts." These details were in some respects of very native character, while in others recalling conventional Christian pictures of the Almighty.

After adducing other illustrations from the records of explorers in Australia and Tasmania, Dr. Taylor concluded his paper by saying that, in examining a good many savage religions, he had come to the same result. In the religion of the lower races the civilized observer found himself on a familiar ground among ghosts, fairies, devils, and deities of the sky, of the sun, and of the river. Therefore, native religions extended to the distinct appreciation of gods of high rank in a polytheistic system; but to go one step further, and to look for any ideas of one supreme good being and one potent evil being, was to get beyond the religion of the lower races altogether.

AGRICULTURAL LOSSES FROM INSECTS.¹

At the last meeting of the association, in Champaign, Ill., I had the honor of a conversation with assistant secretary, the Hon. Edwin Willits, and he mentioned that he was frequently asked for information as to the advisability of

¹ From address of James Fletcher, president, at the third annual meeting of the Association of Economic Entomologists.

large expenditures for entomological purposes, and that, although entomologists frequently spoke of the large losses from insects, we did not provide politicians — and particularly himself — with data by which they could explain and justify these expenditures, which those who understood them knew to be of such enormous importance, and when we wished to point out the great injuries done by insects we had to go back continuously to old published records which we had all been quoting for upwards of ten or twenty years. Now we find upon investigation that accurate estimates of damage done by insects are exceedingly difficult to arrive at, and the figures are so large that we are rather afraid to quote them ourselves lest we should prevent rather than encourage investigation, and it has been the custom of entomologists to minimize the estimates for fear they should not be believed. Now the necessity has arisen, I think, and I lay it before the association for action, in the direction of gathering together some reliable recent statistics in a short form which may be printed for distribution, and which will cover the more important injuries to date, and the part the work of the entomologist has played in reducing injury or preventing loss, so that we may overcome this difficulty and provide legislators and ourselves with data with which to meet this argument. After a careful examination and great effort to obtain data I have found that there are certain of these large estimates which appear to be reliable. I think better results will follow the publication of a few quite reliable statistics, which may be taken as typical instances, than by accumulating a large number of items which would increase the chance of error and might not be read so carefully. By way of example, I will refer to the chinch bug. I have examined carefully the estimates which have been published concerning that particular insect, and the following are probably quite reliable and appear to have been made with due regard to all collateral considerations, as the increased value of the saved crops, the cost of remedial measures, and similar subjects.

In 1864 Dr. Shimer's estimate, which I find was drawn up with very great care, put the loss in the one State of Illinois to the corn and grain crops at \$73,000,000. In Dr. Riley's "Reports on the Injurious Insects of Missouri," we find in 1874 there was a reliable estimate of the loss to that State by the same insect of \$19,000,000. In 1887 Professor Osborn's estimate, founded upon the reports of the correspondents of the State Agricultural Society of Iowa, put the loss in that State on corn and grain at \$25,000,000; and, last, Mr. Howard's estimate, as given in the entomologist's report for 1887, for the nine States infested by the chinch bug in that year, was \$60,000,000.

Now, gentlemen, I think that these statistics of the injuries to crops by one insect alone are probably as reliable as any we can get, and they give a good argument which we may use as showing the depredations of insects; but it is not sufficient that we can convince people that great injury is going on, we must show that we are doing something to mitigate this injury. In Professor Comstock's report for 1879 the estimate of the possible loss in years of general prevalence of the cotton Aletia is placed at \$30,000,000 through the cotton States. The injuries by grasshoppers in the different States of the Union, and also occasionally through the British North American provinces, have been so enormous that figures hardly give an idea of the injury they do, but they are known by all to be enormous.

As an instance, however, of what may be done to mitigate their attacks, I would merely mention those for this year,

which seem to have been very considerable. In the States of North Dakota and Minnesota it is probable that at least \$400,000 have been saved on account of work done by direct advice of entomologists — work they have in some instances forced upon the farmers. Two hundred thousand dollars is a probable estimate of the amount saved by ploughing the land last autumn. Another equal amount has been saved by the use of "hopperdozers." Professor Bruner tells me that a sufficient number of grasshoppers have been actually taken this year, which, if left alone and allowed to lay their eggs, might next year have devastated the whole crops of these two States and the adjoining parts of Manitoba. These successful operations have been carried on by the State entomologist of Minnesota, Professor Lugger, and by Professor Waldron of North Dakota, ably aided by the advice and assistance of the agent of the Department of Agriculture, Professor Bruner, under Professor Riley's instructions; and I think it is no exaggeration to say that at least \$400,000 have been actually saved in hard cash on this year's crop, not to speak of the enormous loss which would most probably have followed next year had they been left alone, and had climatic conditions been favorable for their increase.

The amount of damage done to crops every year is so vast that the figures excite incredulity from those who do not study crop statistics. The agricultural products of the United States are estimated at about \$3,800,000,000. Of this it is thought that about one-tenth is lost by the ravages of insects. This is in many cases unnecessary. In short, a sum of \$380,000,000 is given up without a murmur and almost without a struggle by the people of the United States.

Crops of all kinds are injured, and simple remedies are known for many of the attacks, and are more or less adopted. Some have already come into general use. Paris green is now applied to potato fields almost as much as a matter of course, as manure is to fertilize the soil. As an instance of how a saving may be made even in well established methods, I give the following: Through the work of Mr. W. B. Alwood of the Virginia Experiment Station, improved machinery and the water mixtures of poisons have come into general use among the farmers and potato-growers in the Norfolk region, and some of the largest growers now claim that they at present do for from \$40 to \$60 what used to cost them from \$500 to \$600. To-day, in California and Florida, orange trees are universally treated with kerosene and resin emulsions or poisonous gas for scale insects.

In the treatment of cabbage caterpillars, pyrethrum diluted with four times its weight of common flour, and then kept tightly closed for twenty-four hours, leaves nothing to be desired, and thousands of dollars are yearly saved to small growers who most need the assistance.

Many excellent remedies have been devised by a mere modification of existing agricultural methods. Instances of these are found in the early and late sowing or harvesting of some crops, as sowing turnips between the broods of the turnip flea-beetle, the late planting of cabbage for the root-maggot, the late sowing of wheat for the Hessian-fly, etc. In the 1879 Report of the United States Department of Agriculture was first detailed the only successful method of treating the clover-seed midge by cutting or feeding off the first crop before the young larvæ are sufficiently matured to leave the heads and go into the ground to pupate. This was simply a change of one week, by which not only is the insect destroyed, but the clover is saved in better condition than under the old method.

During the present summer Professor Osborn has discov-

ered that a serious pest of the clover plant, *Grapholitha interstinctana*, a small moth, may be destroyed in all its stages by simply stacking the hay soon after it is cut.

In the Southern States Mr. Howard Evarts Weed writes to me with regard to the cotton worm: "The loss would indeed be great were it not for the fact that the planters keep it in check by the prompt application of Paris green in a dry form. The only method now used is to apply it by means of two sacks attached to a pole and borne through the plantations by a negro mounted on a mule, who rides down the rows of plants. This gives perfect satisfaction, and the farmers of the State tell me that they want no better remedy for this insect."

Mr. F. W. Mally writes on the same subject: "The benefit which the public generally derives from the researches of economic entomologists is well illustrated by the result of the cotton-worm investigation published in the fourth report of the United States Entomological Commission. In that report estimates of damage, etc., are given, and I will only allude to the benefit which the planters have derived from the report. Formerly, planters waited until the August brood of the *Aletia* issued and depredated on their cotton. This brood may be called the migratory one, since it spreads over vast areas of cotton fields. At that time, too, the planters used Paris green just as they purchased it from the dealers. They have now been educated to know that the *Aletia* propagates in certain quite well-defined centres earlier in the season, and that if taken in July (or about five weeks earlier than they had been accustomed to), they can prevent their spreading to larger areas. Now, too, they dilute the Paris green with flour and finely-sifted wood ashes, greatly reducing the cost of the poison per acre. At the same time the acreage or area to which poison is now applied has been reduced tenfold; at least. For example, here in the Red River Valley, for 30 miles up and 50 miles down the river in July there were only two plantations (together about 2,000 acres) upon which *Aletia* was found. In August this brood would have spread over almost the entire section mentioned. Paris green was applied to this limited infested area, and the larger areas saved from injury. The saving is hardly to be estimated. The above appears to me to be one of the greatest triumphs of economic entomology, and, I may truthfully say, also of my most estimable chief, Dr. C. V. Riley."

With regard to another injurious insect, the following facts well illustrate what may be done by following the advice of an experienced entomologist.

During the year 1885 the Hon. Moses Fowler, a wealthy banker and landowner of Lafayette, Ind., applied to Professor F. M. Webster, an agent of the United States Department of Agriculture, then located at that place, for relief from very serious depredations by an unknown enemy to his corn, which was damaging some of his fields from 5 to 75 per cent, he having this year 10,000 acres of land devoted to this crop. Upon examination the depredator proved to be the well-known corn-root worm, the larva of *Diabrotica longicornis*. Mr. Fowler estimated the loss in his fields by reason of this insect at \$10,000, with a probability of still greater injury the following year. On the advice of Mr. Webster, the next season he sowed 5,000 acres of the worst infested lands to oats, and the following year the other 5,000 acres was treated in the same manner, the first 5,000 acres being this year again devoted to corn. As a result of a continuation of this rotation the pest has been practically exterminated, thereby, according to Mr. Fowler's estimate, saving him \$10,000 per annum.

Professor Osborn has shown that grass insects destroy much produce. He estimates that the small leaf-hoppers (*Jassidæ*) destroy as much food from two acres of pasture as would feed one head of stock. From recent experiments he has found that it is possible by the use of hopperdozers to reduce the numbers of these insects so materially that, upon two plots chosen for their similarity of the conditions of the growth, the amount of hay produced upon a plot which was once treated with the hopperdozer was 34 per cent greater than upon the corresponding untreated plot.

VIRCHOW, THE MAN AND THE STUDENT.¹

By his commission the physician is sent to the sick, and, knowing in his calling neither Jew nor Gentile, bond or free, perhaps he alone rises superior to those differences which separate and make us dwell apart, too often oblivious to the common hopes and common frailties which should bind us together as a race. In his professional relations, though divided by national lines, there remains the feeling that he belongs to a Guild which owes no local allegiance, which has neither king nor country, but whose work is in the world. The Æsculapian temple has given place to the hospital, and the priestly character of the physician has vanished with the ages; still there is left with us a strong feeling of brotherhood, a sense of unity, which the limitations of language, race, and country have not been able to efface. So it has seemed meet and right to gather here this evening to do honor to a man — not of this country, not of our blood — whose life has been spent in the highest interests of humanity, whose special work has revolutionized the science of medicine, whose genius has shed lustre upon our craft.

The century now drawing to a close has seen the realization of much that the wise of old longed for, much of which the earnest spirits of the past had dreamt. It has been a century of release — a time of the loosening of bands and bonds; and medicine, too, after a long enslavement, ecclesiastical and philosophical, received its emancipation. Forsaking the traditions of the elders, and scouting the Shibboleth of schools and sects, she has at last put off the garments of her pride, and with the reed of humility in her hand sits at the feet of her mistress, the new science. Not to any one man can this revolution be ascribed; the *Zeit-geist* was potent, and like a leaven worked even in unwilling minds; but no physician of our time has done more to promote the change, or by his individual efforts to win his generation to accept it, than Rudolph Virchow.

And now, as the shadows lengthen, and ere the twilight deepens, it has seemed right to his many pupils and friends, the world over, to show their love by a gathering in his honor, on this his seventieth birthday. To-day, in Berlin, a *Fest* has been held, in which several hundred members of the profession in this and other countries have been participants, as subscribers to the fund which was organized for the occasion. It seemed well, also, to his pupils who are teachers in this university, and to others, that the event should be marked by a reunion at which we could tell over the story of his life, rejoice in his career, and express the gratitude which we on this side of the Atlantic feel to the great German physician.

Let me first lay before you a brief outline of his life:

Rudolph Virchow was born Oct. 13, 1821, at Schivelbein, a small town in Pomerania. Details of his family and of his childhood, which would be so interesting to us, are not available. Educated at the Gymnasium in Berlin, he left it at Easter, 1839, to begin his medical studies, and graduated from the university of that city in 1843. The following year he became assistant in pathological anatomy to Froriep; and in 1846 he was made professor, and in 1847 a lecturer at the university. In 1849, on account of his active participation in the political events of the previous year, he was dismissed from his university positions, and, as he mentions, was only *mit grossen beschränkungen* reinstated,

largely, in fact, by the efforts by the profession of Berlin, and particularly of the medical societies. In August, 1849, he received a call to the chair of pathological anatomy at Würzburg, a position which he held until 1856, when, by the unanimous vote of the faculty, he was recommended for, and received the appointment which he still holds, namely, professor of pathological anatomy at Berlin. Prior to leaving Berlin he founded, in 1847, his celebrated *Archiv*, now in its one hundred and twenty-eighth volume, which is the greatest storehouse of facts in scientific medicine possessed by us to day.

Externally, at least, an uneventful, quiet, peaceable life with few changes.

As an illustration of the successful pursuit of various callings, Virchow's career is without parallel in our profession, and this many-sidedness adds greatly to the interest of his life. Dr. Welch will speak of his special labors in the science of pathology; and other aspects will be considered by Dr. Chew and Dr. Friedenwald. I propose to indicate briefly a few traits in his life as a man of science and as a citizen.

From the days of the great Stageirite, who, if he never practised medicine, was at least an asclepiad and an anatomist, the intimate relation of medicine with science, has in no way been better shown than in the long array of physicians who have become distinguished in biological studies. Until the gradual differentiation of subjects, necessitated by the rapid growth of knowledge, the physician, as a matter of course, was a naturalist; and in the present era, from Galen to Huxley, the brightest minds of the profession in all countries have turned towards science as a recreation or as a pursuit. Alas! that in the present generation, with its strong bent toward specialism, this combination seems more and more impossible. We miss now the quickening spirit and the wiser insight that come with work in a wide field; and in the great cities of this country we look in vain among practising physicians for successors of Jacob Bigelow of Boston, Holmes of Montreal, Barton of Philadelphia, and others — men who maintained in this matter an honorable tradition, whose names live in natural history societies and academies of natural science, in the founding of which they were mainly instrumental.

In anthropology and archæology the name of Rudolph Virchow is almost as well known as it is in medicine. Very early in his work we find evidences of this bent in the memorable studies, now forty years ago, on cretins and on the development of the skull. Not a year has passed since that time without some notable contribution from him on these subjects; and those of us who know only his professional side may well marvel at the industry of the man whose name is quoted and appears in anthropological memoirs and journals as often as in our technical works. In recognition of his remarkable labors in this department, a special anthropological institute was organized in 1881, on the occasion of the twenty-fifth year of his professoriate. In 1884, on returning to Berlin for the first time since my student days, I took with me four choice examples of skulls of British Columbian Indians, knowing well how acceptable they would be. In his room at the Pathological Institute, surrounded by crania and skeletons, and directing his celebrated *diener*, who was mending Trojan pottery, I found the professor noting the peculiarities of a set of bones which he had just received from Madeira. Not the warm thanks, nor the cheerful greeting which he always had for an old student, pleased me half so much as the prompt and decisive identification of the skulls which I had brought, and his rapid sketch of the cranial characters of the North American Indian. The profound expert, not the dilettante student, has characterized all of his work in this line. Even an enumeration with a brief report of his published writings in anthropological and archæological subjects would take more time than has been allotted to me. Of his relations with Schliemann I must say something, which I could not do so well as in the words used by his friend, Dr. Jacobi, ten years ago: "Schliemann, by whose modern witchcraft holy old Troy is just leaving its tomb, invited Virchow to aid him in his work of discovery of the buried city. He went — partly to aid, partly, as he says, to escape from overwhelming labors at home — only to be engrossed in just as hard work, though of a different nature. In regard to the latter, Schliemann's recent book on

¹ Address by William Osler, M.D., professor of medicine in the Johns Hopkins University, on the seventieth birthday of Professor Virchow, Oct. 13, at Baltimore.

'Ilios' contains some very interesting material. But what has engaged my attention and interest most has been to observe the humanity and indefatigability displayed by the great man in the service of the poor and sick. To read of his constant, practical exertions in behalf of the miserable population of Hissarlik; how he taught the aborigines the efficacy of chamomile and juniper, which grow about them, unnoticed and unused, in rare abundance; how a spring he laid open for archæological purposes has been called by them 'the physician's,' and is believed to have beneficial effects; how he was, on leaving the neighborhood, loaded with flowers, the only thing they had and knew would please him, has charmed me intensely. To admire a great man for his professional labors, eagerly undertaken and successfully carried out, is a great satisfaction to the scientific observer; to be able to love him, in addition, for his philanthropy and warm-heartedness, is a feast of the soul."

Virchow's life work has been the study of the processes of disease, and in the profession we revere him as the greatest master that has appeared among us since John Hunter. There is another aspect of his work which has been memorable for good to his native city. From the day when, as a young man of twenty-seven, he was sent by the Prussian Government to Upper Silesia to study the typhus epidemic, then raging among the half-starved population, he has been one of the most powerful advocates in Germany for sanitary reform; and it is not too much to say that it is largely to his efforts that the city of Berlin owes its magnificent system of drainage. His work in this department has been simply monumental, and characterized by the thoroughness which marks the specialist.

To his exhaustive monographs on camp-diseases, cholera, military medicine, and other cognate subjects, I cannot even refer.

It will be generally acknowledged that in this country doctors are, as a rule, bad citizens, taking little or no interest in civic, state, or national politics. Let me detain you a moment or two longer to tell of one of us, at least, who, in the midst of absorbing pursuits, has found time to serve his city and his country. For more than twenty years Virchow has sat in the Berlin City Council as an alderman, and to no feature in his extraordinary life does the Berliner poin with more justifiable pride. It is a combination of qualities only too rare, when the learned professor can leave his laboratory and take his share in practical, municipal work. How much his colleagues have appreciated his efforts has been shown by his election as vice president of the Board; and on the occasion of the celebration in 1881, the *Rathhaus* was not only placed at the disposal of the committee, but the expenses of the decorations, etc., were met by the council; and to-day comes word by cable that he has been presented with the freedom of the city.

The years succeeding to Virchow's student days were full of strong political feeling, and with the French Revolution in 1848, came a general awakening. In Germany the struggle for representative government attracted many of the ardent spirits of our profession, and it was then that Virchow began his political career. The revolution was a failure, and brought nothing to the young prosecutor but dismissal from his public positions. His participation might have been condoned had he not issued a medico-political journal, *Die Medicinische Reform*, the numbers of which are even now very interesting reading, and contain ideas which to-day would be called liberal, but were then revolutionary. It is a striking evidence of the deep impression which even at that time Virchow had made upon his colleagues and the profession, that he was reinstated in his office at the urgent solicitation of the medical societies of the city. He relates in his "Gedächtnissrede auf Schönlein," who was the court physician and not at all in harmony with the views of his prosecutor, that on one occasion in 1848, at a post-mortem, in which the diagnosis of hemorrhage into the brain had been made by the professor, Virchow demonstrated an obstructing embolus in the artery. Schönlein turned to him in a half vexed, half-joking manner and said, "Sie sehen auch ueberall Barrikaden." His active political life dates from 1862, when he was elected to the lower house from one of the Berlin districts, and has, I believe, sat as member almost continuously from that date. The conditions in Germany have not been favor-

able to a man of advanced liberal views, and Virchow has been attached to a party which has not been conspicuously successful; but he has been an honest and industrious worker, a supporter of all measures for the relief of the people, a strenuous opponent of all class and repressive legislation, and above all an implacable enemy of absolutism as personified in Bismarck. A man of such strong individuality would make his presence felt in any assembly; and he always commanded the attention of his colleagues, and oftentimes his speeches have been reported fully both in England and in America.

As an illustration of his capacity for varied work, I recall one day in 1884, in which he gave the morning demonstration and lecture at the Pathological Institute, addressed the Town Council at great length on the extension of the canalization scheme, and made a budget speech in the House, both of which were reported at great length in the papers of the next day.

Naturally, amid such diverse occupations, it has been impossible for him to enter with his old vigor into the minutiae of pathological anatomy, and his attitude of late years has been critical rather than productive; but his interest in all that pertains to our profession is unabated, and is a feature of his character to which I must allude. Too often with us, in our gatherings and society meetings, the "men of rathe and riper years" are conspicuous by their absence. In this respect our great master has set a notable example. Amid cares and worries, social and political, with a thousand and one ties and duties, he has never held aloof from his brethren; but, as the weekly medical journals testify, no man in Berlin has been more active, and for years he has held the presidency of the Berliner Medicinische Gesellschaft, one of the most important medical societies of Europe.

Surely the contemplation of a life so noble in its aims, so notable in its achievements, so varied in its pursuits, may well fill us with admiration for the man, and with pride that he is a member of our profession. The influence of his work has been deep and far-reaching, and in one way or another has been felt by each one of us. It is well to acknowledge the debt which we every-day practitioners owe to the great leaders and workers in the scientific branches of our art. We dwell too much in corners, and, consumed with the petty cares of a bread-and-butter struggle, forget that outside of our routine lie Elysian fields into which we may never have wandered, the tillage of which is not done by our hands, but the fruits of which we of the profession (and you of the public) fully and freely enjoy. The lesson which should sink deepest in our hearts is the answer which a life, such as Virchow's, gives to those who to-day, as in past generations, see only pills and potions in the profession of medicine, and who, utilizing the gains of science, fail to appreciate the dignity and the worth of the methods by which they are attained. As Pausanias pestered Empedocles, even to the end, for the details of the cure of Pantheia, so there are with us still those who, "asking not wisdom, but drugs to charm with," are impatient at the slow progress of science, forgetting that the chaos from which order is now appearing has been in great part dispelled by the work of one still living — by the man whom to night we delight to honor.

BOOK-REVIEWS.

Across Russia from the Baltic to the Danube. By CHARLES AUGUSTUS STODDARD. New York, Scribner. 8°. \$1.50.

STODDARD's journey, the story of which is told in this volume, began at Paris, and extended through Sweden and Finland, to Russia, which he entered at Cronstadt. Much time was spent at St. Petersburg, and then the journey was resumed to Moscow, to which again much attention was given. The closing chapters of the book contain the account of what the author saw, or thought, while he was at Nijni-Novgorod, or was journeying west through Warsaw, the Carpathian Mountains, and Hungary, to Budapesth.

The book is the narrative of one who knows how to make the stories of his wanderings entertaining. The style is that of a conversationalist rather than of the writer. Skipping along lightly from one topic to another, the author almost seems before you armed with stereopticon views of the scenes he is describing. And

here it may be said that a dozen excellent illustrations are given, all of which are by the "half-tone" process from photographers, — so admirably suited to purely descriptive work. These are good examples of this kind of work, and seem unusually uniform in their clearness of detail and free from the blotches due to imperfections in the photographs.

Stoddard made no attempt to study Russia, but went to see the sights, and in this book gives a chatty account of them. At this time, when so much attention is attracted to Russia, this picture of Russian scenes will aid in gaining a clearer insight into the difficult social problems which are calling for solution within her borders.

AMONG THE PUBLISHERS.

THE following tribute to the work of an American magazine is contained in the report of the Secretary of the Interior just submitted to Congress: "Your attention is also requested to the paper contributed by Mr. John Muir to the number of *The Century Illustrated Monthly Magazine* for November, 1891, entitled 'A Rival of the Yosemite — the Cañon of the South Fork of Kings River, California.' It furnishes maps of this section and is illustrated by most admirable engravings of the wonderful scenery there existing. The engravings are chiefly from the pencil of Mr. Charles D. Robinson. These gentlemen, as well as the editors of *The Century*, especially Mr. Johnson, have taken a great personal

interest in the forest reserves in California, and are worthy of great consideration, both from their experience and intelligence. The magazine article mentioned advocates the extension of the Sequoia National Park so as to embrace the Kings River region and the Kaweah and Tule Sequoia groves. The boundaries are there set forth. The subject is recommended to your favorable consideration and action."

— The Scientific Publishing Company has arranged for the following books, which are now in Press: "The Phosphates of America: where and how they occur; how they are mined; and what they cost; with practical treatises on the manufacture of sulphuric acid, acid phosphate, phosphoric acid and concentrated superphosphates, and select methods of chemical Analysis," by Dr. Francis Wyatt; "Manual of Qualitative Blowpipe Analysis and Determinative Mineralogy," by Dr. F. M. Endlich; "The Chemistry of a World," by Dr. T. Sterry Hunt.

— A series of papers, "Stories of Salem Witchcraft," by Winfield S. Nevins, is begun in the December *New England Magazine*. The first article gives an account of the witchcraft cases in New England previous to 1692; the outbreak in Salem Village; the court and places of trial; a history of the trials of accused persons, and copious quotations from the remarkable testimony in the court files are given, and the article is embellished with portraits and drawings. The article is interesting at this time, as

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By LESTER F. WARD.

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